Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (CURRENTLY AMENDED) A method of ~~measuring properties~~ determining the size of particles, comprising the steps of:

generating a beam of radiation which is propagated along a principal direction,

illuminating with the beam an observation region which is occupied or transited by a plurality of particles, a portion of the beam ~~giving rise to~~ yielding radiation which is scattered by scattering interaction of ~~that~~ the portion of the beam with the particles, and another portion being transmitted substantially undisturbed along the principal ~~axis~~ direction through the observation region, and

detecting, in a plane disposed on the propagation direction, a plurality of radiation intensity values ~~which are~~ determined by the interference between the scattered radiation and the transmitted radiation,

identifying ~~systems~~ a plurality of interference fringes associated respectively with ~~the~~ each individual ~~particles~~ particle in which the interference pattern is affected by a phase delay of the scattered radiation relative to the transmitted radiation, the delay being determined by the interaction of the radiation beam with ~~the particles~~ said individual particle, and

determining the ~~properties~~ size of ~~the particles~~ each particle on the basis of the fringes that are affected by the phase delay.

2. (CURRENTLY AMENDED) A method according to Claim 1 in which the identification of the plurality of interference fringes ~~fringe systems~~ comprises a determination of the fractional order at the ~~centre~~ center relative to each of the plurality of interference ~~individual fringe systems~~ fringes associated with each particle.

3. (CURRENTLY AMENDED) A method according to Claim 1 in which the identification of the plurality of interference fringes ~~s fringe systems~~ comprises a determination of ~~the depth of~~ intensity modulation relative to each of the plurality of interference ~~individual fringe systems~~ fringes associated with each particle.

4. (PREVIOUSLY PRESENTED) A method according to claim 1 in which the radiation beam has a plane wave front.

5. (PREVIOUSLY PRESENTED) A method according to Claim 4 in which the detection plane is disposed at a predetermined distance z_M from the observation region such that the relationship $z_M > a^2 / \lambda$ is valid, where λ is a characteristic value for the wavelength of the radiation used and a is dimension which is characteristic of the particles contained in the observation region.

6. (PREVIOUSLY PRESENTED) A method according to claim 1 in which the radiation beam is focused in the vicinity of the observation region.

7. (CURRENTLY AMENDED) A method according to Claim 6 in which the position of the observation region is selected so as to be outside the Rayleigh zone ~~close to the position of smallest diameter of the beam~~.

8. (CURRENTLY AMENDED) A method according to claim 1 in which the radiation is focused by ~~means of~~ a cylindrical lens ~~so as~~ to form a thin blade of light which illuminates the observation region substantially one-dimensionally.

9. (PREVIOUSLY PRESENTED) A method according to claim 1 in which the illumination and the detection are performed from opposite sides of the observation region.

10. (CURRENTLY AMENDED) A method according to claim 1, arranged so as to determine the fractional order at the ~~centre~~ center of the ~~system of~~ interference fringes produced by a single particle at a time.

11. (PREVIOUSLY PRESENTED) A method according to claim 1 in which the detection of the plurality of radiation intensity values determined by the interference between the scattered radiation and the transmitted radiation comprises a measurement of the variation of the intensity values over time upon the passage of a particle through the incident beam,

the determination of the properties of the particle being based on the variation over time of the fringes that are affected by the phase delay.

12. (CURRENTLY AMENDED) A method according to Claim 11 in which the determination of the properties of the particles ~~presupposes the determination of~~ comprises ascertaining the position of transit of the particle through the incident beam, ~~by~~ said determination being obtained from analysis of the asymmetry of the variation over time of the intensity values measured.

13. (PREVIOUSLY PRESENTED) A method according to Claim 11 in which the measurement of the variation of the intensity values over time takes place by selection of the zone of transit of the particles.

14. (CURRENTLY AMENDED) A method according to claim 1 in which the determination of the interference ~~fringe systems~~ fringes associated respectively with the particles comprises a determination of the ~~centres~~ centers of a plurality of interference ~~fringe systems~~ fringes produced by a corresponding plurality of particles.

15. (CURRENTLY AMENDED) A method according to claim 14 in which the determination of the interference ~~fringe systems~~ fringes associated respectively with the particles comprises a determination of a power spectrum of the electric field corresponding to the plurality of radiation intensity values.

16. (CURRENTLY AMENDED) A method according to claim 1 in which the determination of the properties of the particles on the basis of ~~the~~ lower-order fringes of the ~~system of~~ interference fringes is programmed in a manner ~~such as~~ to determine the distribution of the dimensions of the particles.

17. (CURRENTLY AMENDED) Apparatus arranged for implementing a measurement method ~~according to Claim 1,~~ for determining size and material of particles, the method comprising the steps of:

generating a beam of radiation which is propagated along a principal direction,

illuminating with the beam an observation region which is occupied or transited by a plurality of particles, a portion of the beam yielding radiation which is scattered by scattering interaction of the portion of the beam with the particles, and another portion being transmitted substantially undisturbed along the principal direction through the observation region, and

detecting, in a plane disposed on the propagation direction, a plurality of radiation intensity values determined by the interference between the scattered radiation and the transmitted radiation,

identifying a plurality of interference fringes associated respectively with each individual particle in which the interference pattern is affected by a phase delay of the scattered radiation relative to the transmitted radiation, the delay being determined by the interaction of the radiation beam with said individual particle, and

determining size and material of each particle on the basis of the fringes that are affected by the phase delay,

the apparatus comprising:

a source of the radiation beam, suitable for illuminating the observation region,

sensor means ~~suitable~~ for detecting the radiation at a plurality of points simultaneously and for making available a signal indicative of the detection, the sensors being disposed on the propagation axis ~~in a manner such as~~ to detect a plurality of radiation intensity values which are determined by the interference between the scattered radiation and the transmitted radiation, in which the interference is affected by a phase delay of the scattered radiation relative to the transmitted radiation, the delay being determined by the interaction of the radiation beam with the particles, and

processing means which are programmed to determine, on the basis of the signal, interference ~~fringe systems~~ fringes associated respectively with the individual particles, and to determine the properties of the particles on the basis of the fringes which are affected by the phase delay.

18. (CURRENTLY AMENDED) Apparatus according to Claim 17, further comprising lens means interposed between the observation region and the sensor means ~~so as~~ to permit indirect detection by detection of the plurality of intensity values in an optically conjugate plane.

19. (PREVIOUSLY PRESENTED) Apparatus according to Claim 17, further comprising a system for shaping the wave front, based on cylindrical optics such as to form a thin blade of radiation for the illumination of the observation region.

20. (PREVIOUSLY PRESENTED) Apparatus according to Claim 17, further comprising a system for shaping the wave front, suitable for focusing the radiation in the vicinity of the observation region.

21. (PREVIOUSLY PRESENTED) Apparatus according to Claim 17, further comprising a system for shaping the wave front, suitable for collimating the radiation that is incident on the observation region.

22. (PREVIOUSLY PRESENTED) Apparatus according to claim 17 in which the sensor means comprise a CCD, NMOS or CMOS sensor.

23. (PREVIOUSLY PRESENTED) Apparatus according to claim 17 in which the sensor means comprise a plurality of photodiodes arranged in manner such as to detect, as a function of time, the intensity distribution produced by the interference between transmitted radiation and scattered radiation.

24. (PREVIOUSLY PRESENTED) Apparatus according to Claim 23 in which the photodiodes are arranged in a manner such as to pick up selectively radiation coming from predetermined zones of transit of the particles.

25. (PREVIOUSLY PRESENTED) Apparatus according to claim 17 in which the source is a multi-coloured source.

26. (NEW) A method according to claim 1, further comprising the step of determining the material of each particle.

27. (NEW) A method according to claim 1, further comprising the step of determining the shape of the interference fringes to determine the shape of each associated particle.